



CTK Co., Ltd.

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Test Results

Time of occupancy on the TX channel in 31.6 sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6

Test mode : GFSK

Channel Frequency (MHz)	Packet Type	Dwell Time (ms)	Test Results	
			Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441	DH 1	0.399	126.40	Complies
	DH 3	1.654	264.00	Complies
	DH 5	2.910	309.33	Complies

$$\text{DH1 Dwell time} = 0.399 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 127.68 \text{ ms}$$

$$\text{DH3 Dwell time} = 1.654 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 264.64 \text{ ms}$$

$$\text{DH5 Dwell time} = 2.910 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 310.39 \text{ ms}$$

Test mode : 8-DPSK

Channel Frequency (MHz)	Packet Type	Dwell Time (ms)	Test Results	
			Time of occupancy on the TX channel in 31.6sec (ms)	Result
2441	3DH 1	0.414	129.60	Complies
	3DH 3	1.672	265.60	Complies
	3DH 5	2.911	309.33	Complies

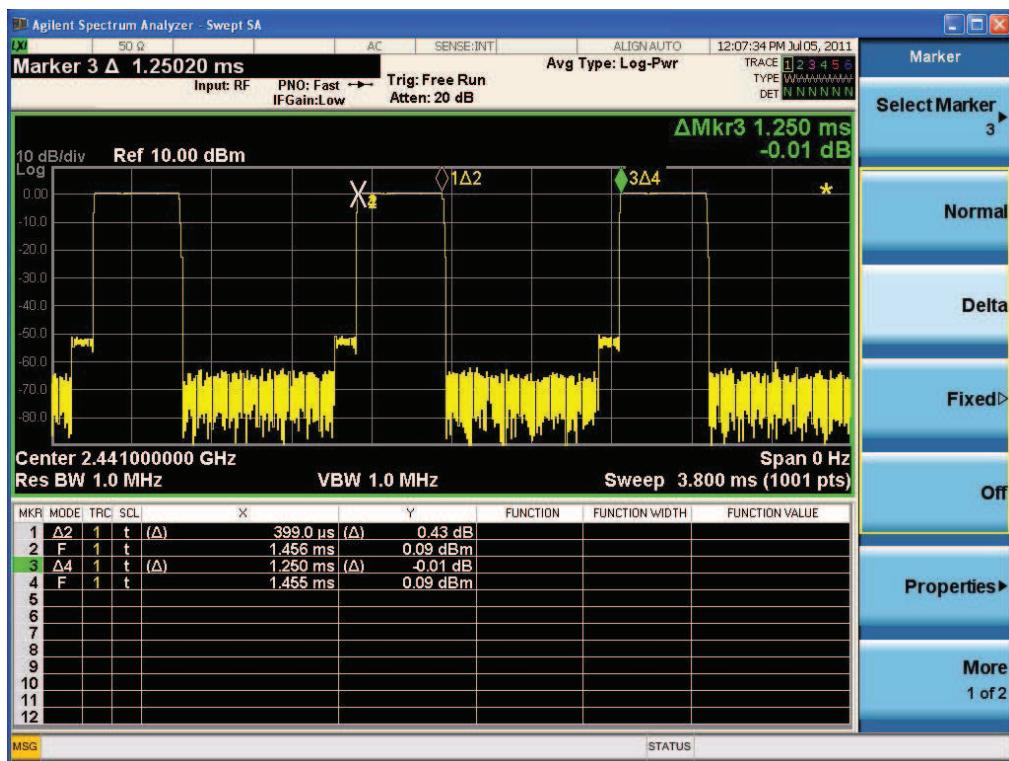
$$\text{3DH1 Dwell time} = 0.414 \text{ ms} \times (1600 \div 2) \div 79 \times 31.6 = 132.48 \text{ ms}$$

$$\text{3DH3 Dwell time} = 1.672 \text{ ms} \times (1600 \div 4) \div 79 \times 31.6 = 267.52 \text{ ms}$$

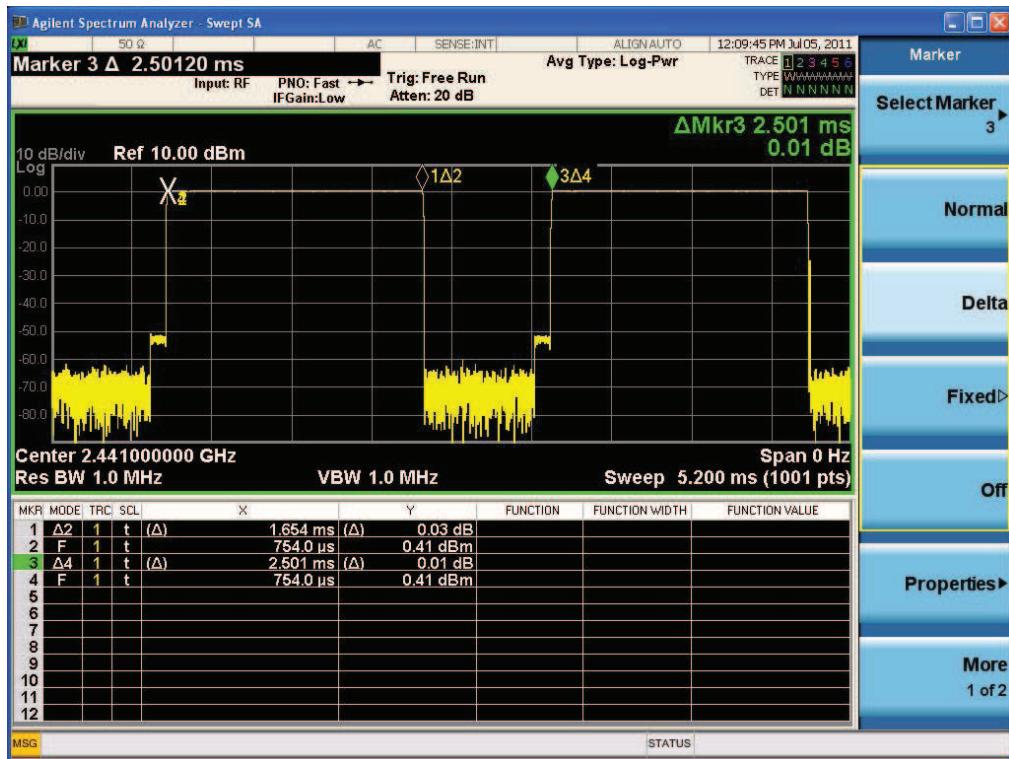
$$\text{3DH5 Dwell time} = 2.911 \text{ ms} \times (1600 \div 6) \div 79 \times 31.6 = 310.50 \text{ ms}$$

See next pages for actual measured spectrum plots.

Time of Occupancy for PACKET Type DH1(GFSK)



Time of Occupancy for PACKET Type DH3(GFSK)

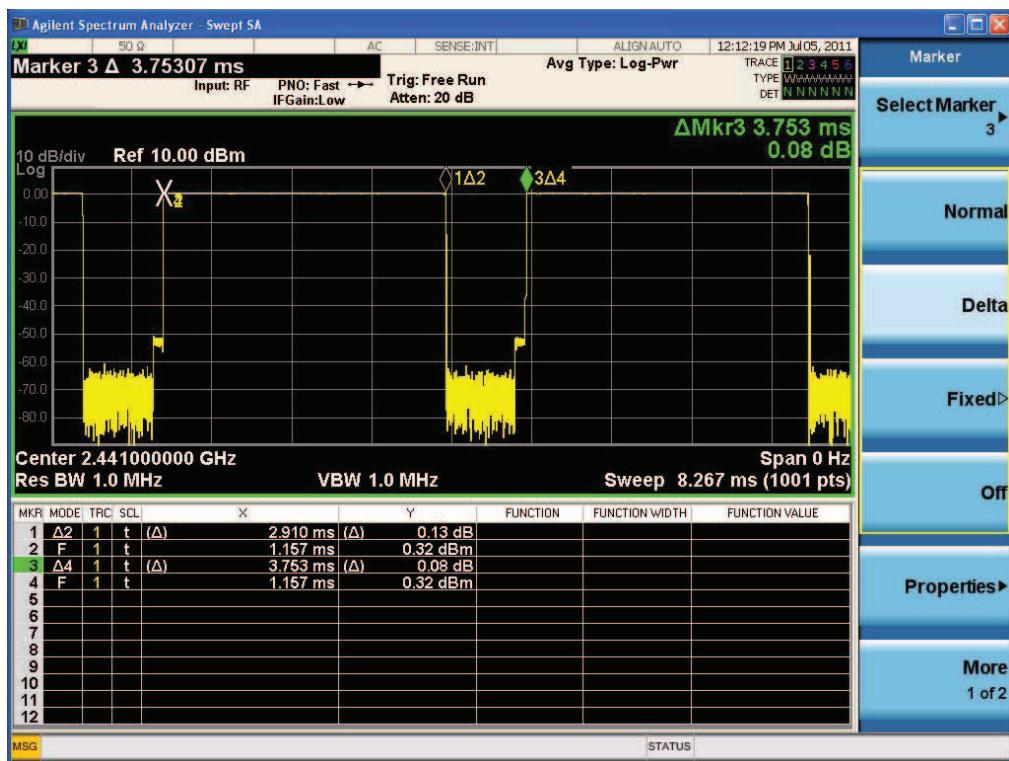




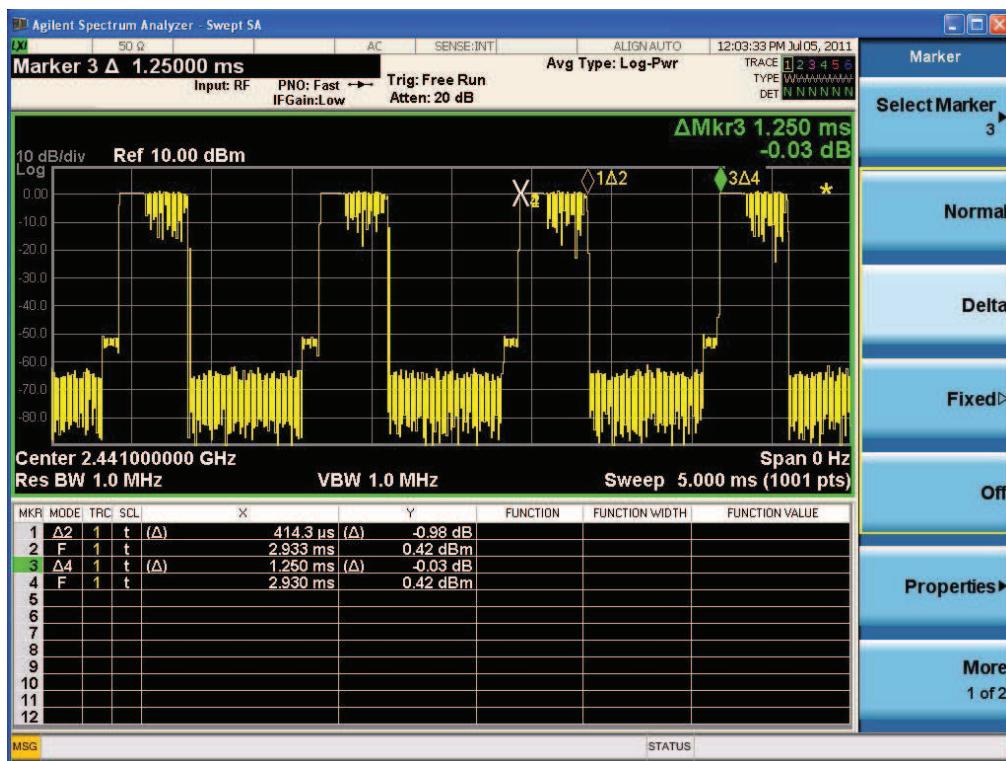
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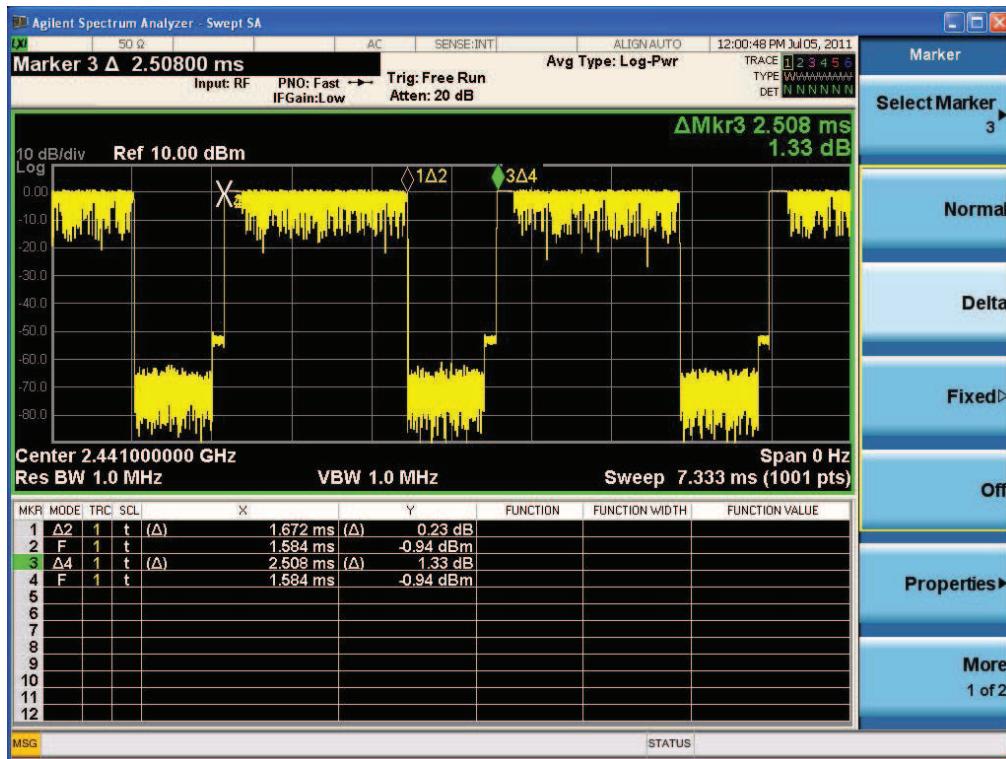
Time of Occupancy for PACKET Type DH5(GFSK)



Time of Occupancy for PACKET Type 3DH1(8-DPSK)



Time of Occupancy for PACKET Type 3DH3(8-DPSK)

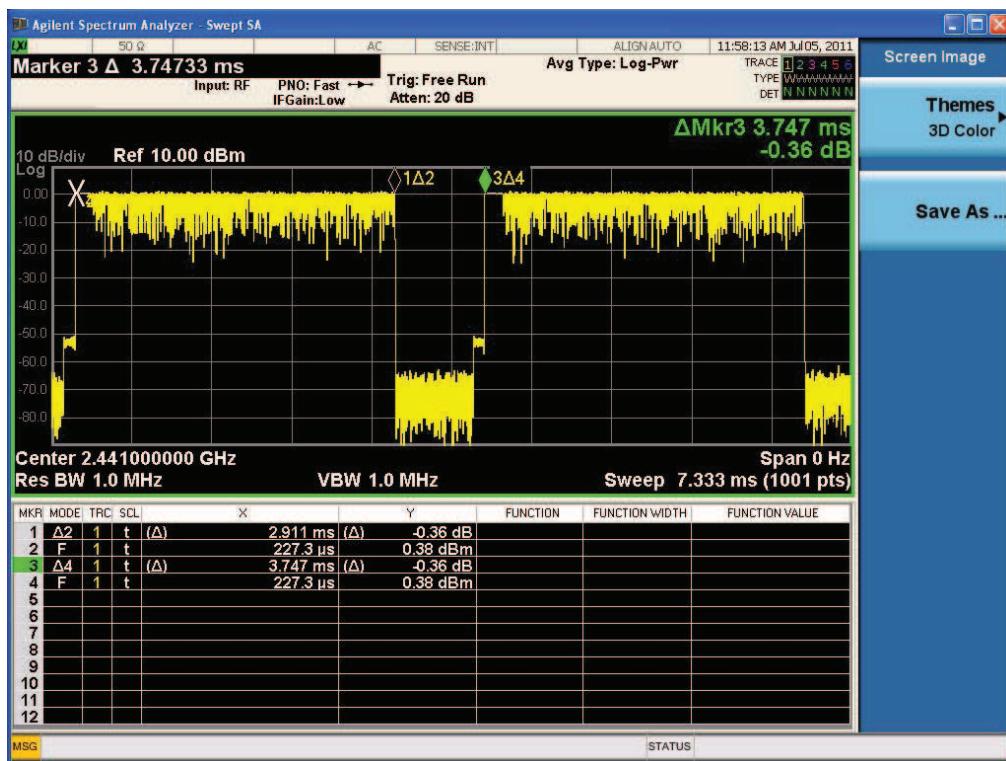




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Time of Occupancy for PACKET Type 3DH5(8-DPSK)



2.1.5 Maximum peak Conducted Output Power

Test Location

RF Test Room

Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

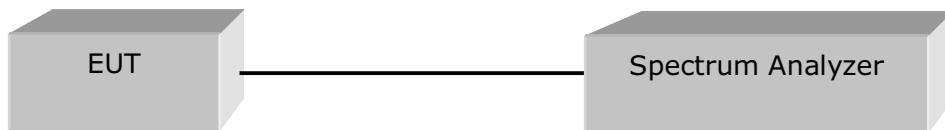
Center frequency = the highest, middle, and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)

VBW = 1 MHz (\geq RBW) Detector function = peak

Trace = max hold Sweep = auto



Limit

§5.247(b)(1) The Maximum Peak Output Power Measurement is 0.125 Watts for frequency hopping system operating in 2400-2483.5 MHz employing at least 15 Hopping channels.

Test Results

Test mode : GPSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

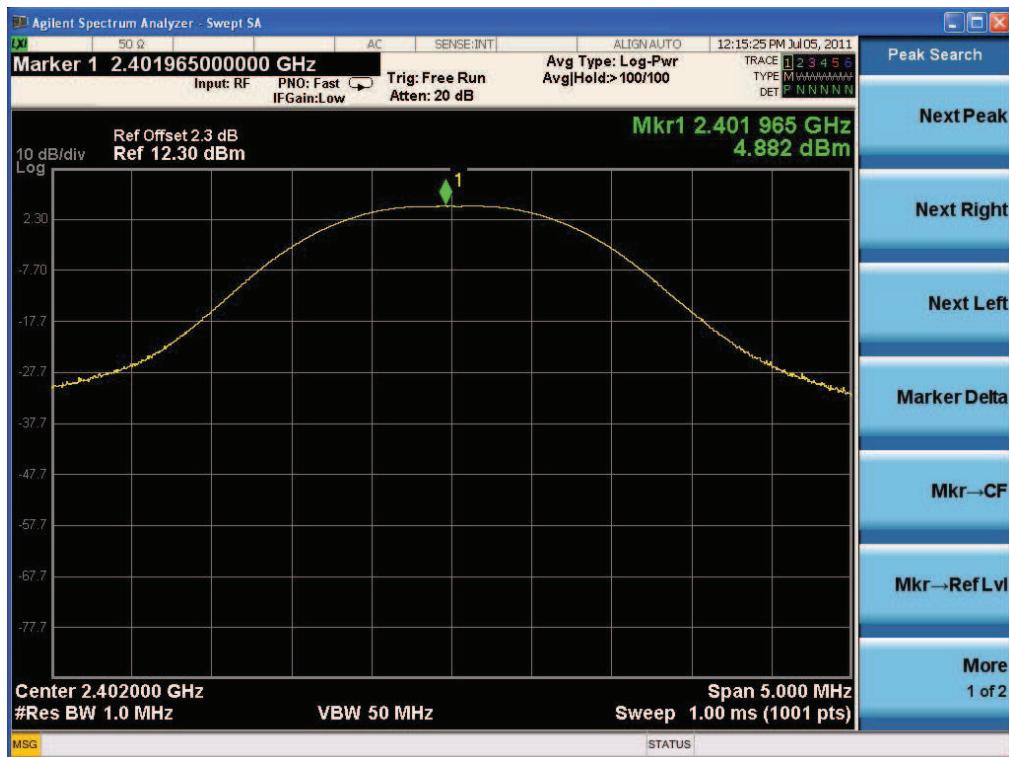
Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	4.882	3.077	Complies
2441	39	5.083	3.223	Complies
2480	78	5.899	3.890	Complies

Test mode : 8-DPSK, CFG PKT Packet Type : 31 Packet Size : 1021(3DH5)

Frequency (MHz)	Channel No.	Peak output power(dBm)	Peak output power(mW)	Result
2402	0	3.512	2.245	Complies
2441	39	3.560	2.270	Complies
2480	78	4.154	2.602	Complies

See next pages for actual measured spectrum plots.

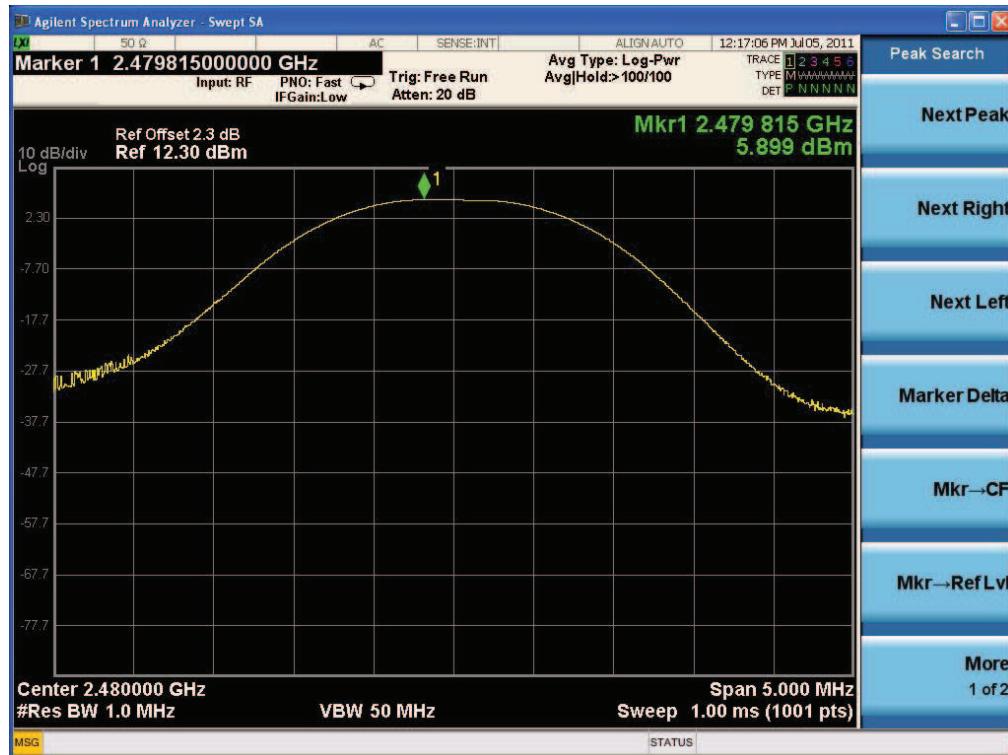
Maximum peak Conducted Output Power – GFSK





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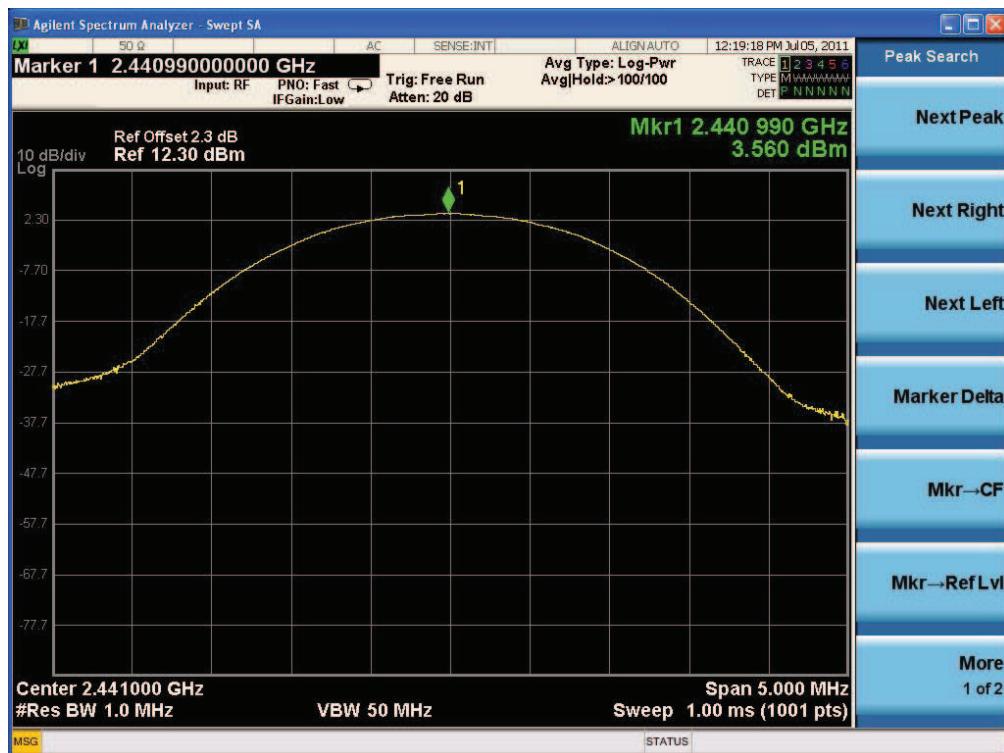
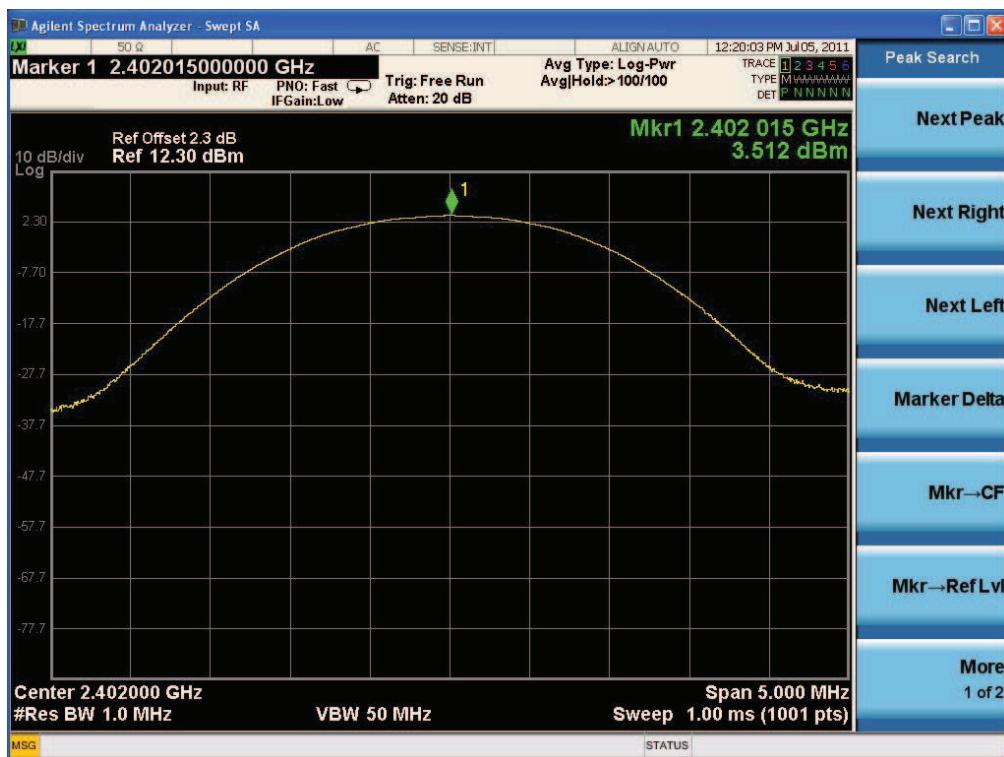




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Maximum peak Conducted Output Power - 8-DPSK





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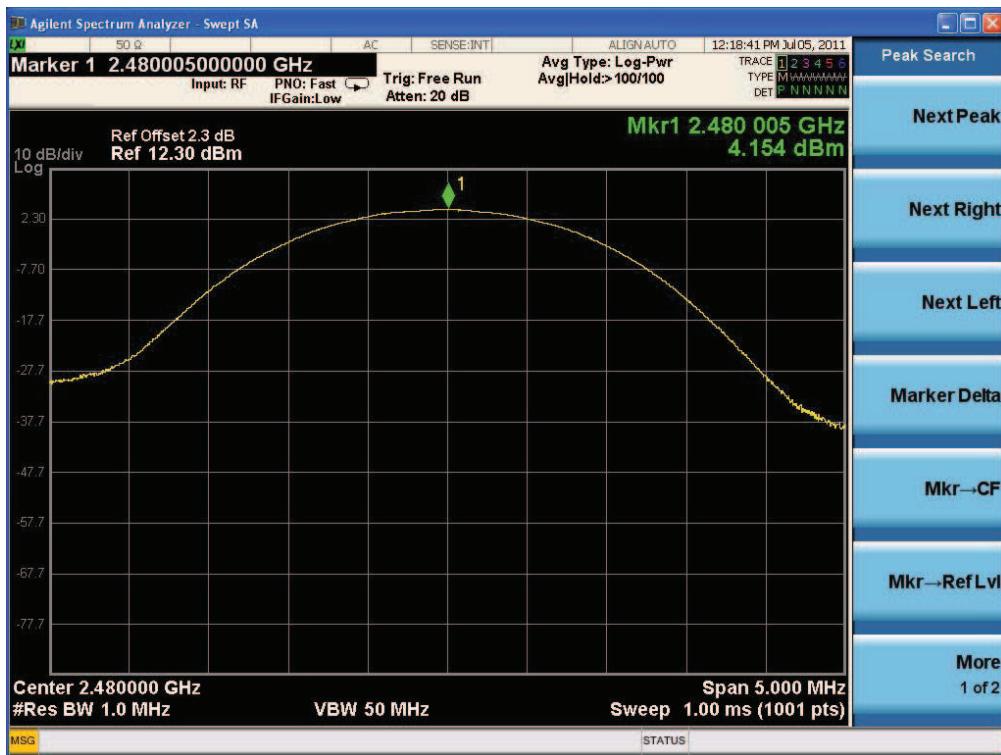
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2.1.6 Band-edge

Test Location

RF Test Room

Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:

Center frequency = the highest, middle, and the lowest channels

RBW = 100 kHz

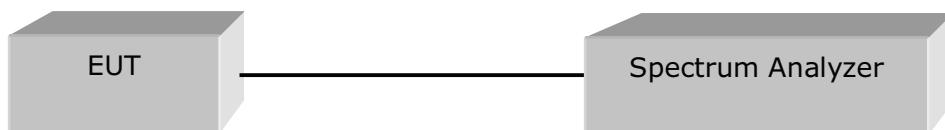
VBW = 100 kHz (\geq RBW)

Span = 10 MHz

Trace = max hold

Detector function = peak

Sweep = auto



Limit

> 20 dBc

Test Results

All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest level of the inband spectral density.
Therefore the applying equipment meets the requirement.

See next pages for actual measured spectrum plots.



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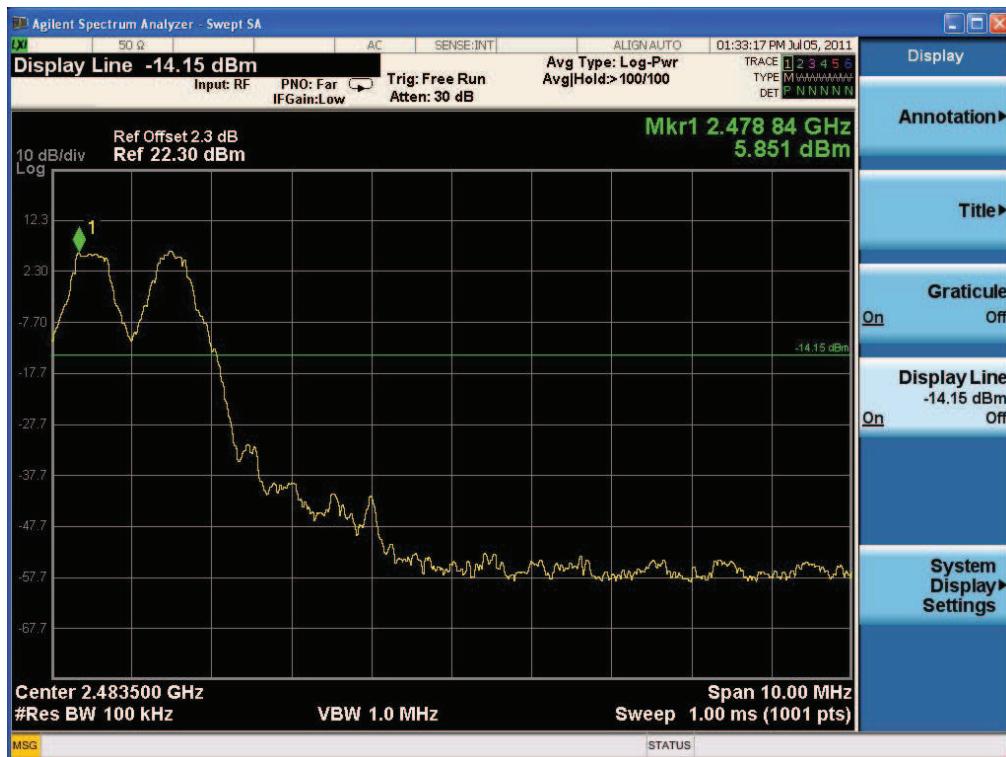
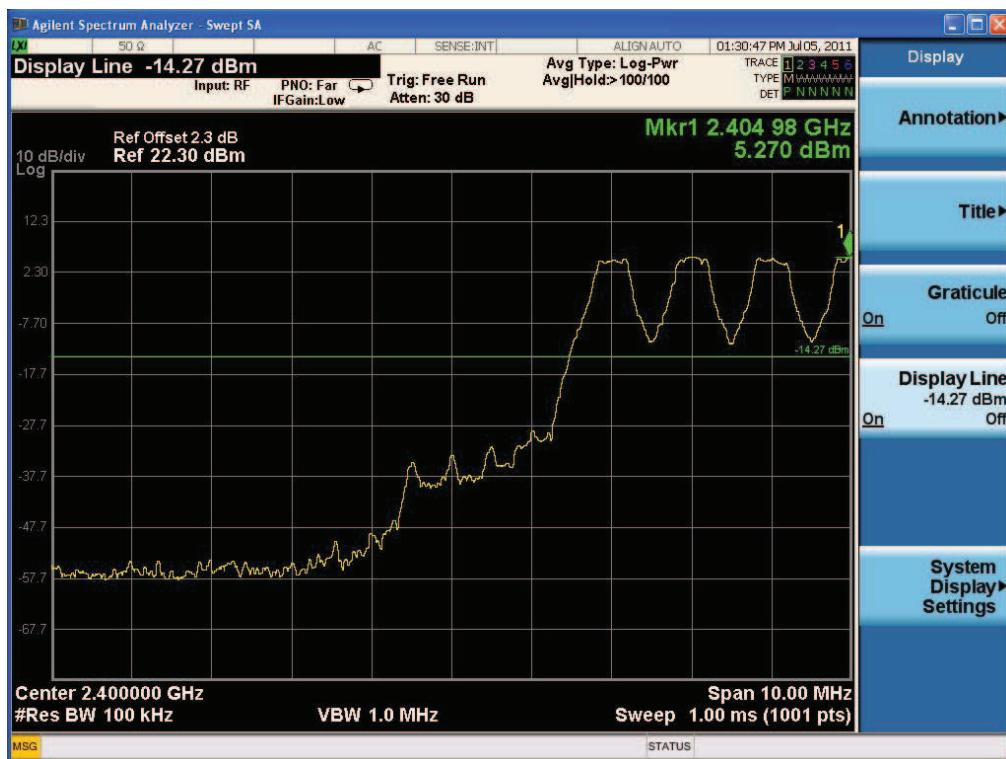
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Band - edge (with Hopping) - GFSK

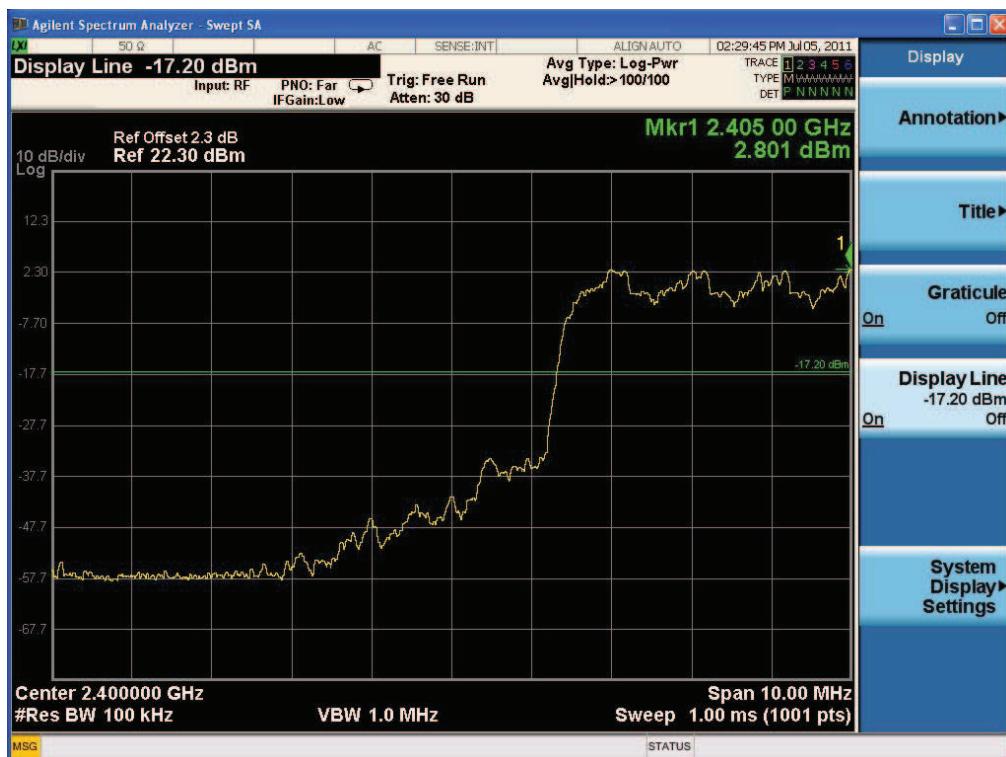




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Band - edge (with Hopping) - 8-DPSK





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Band – edge (without Hopping) – GFSK





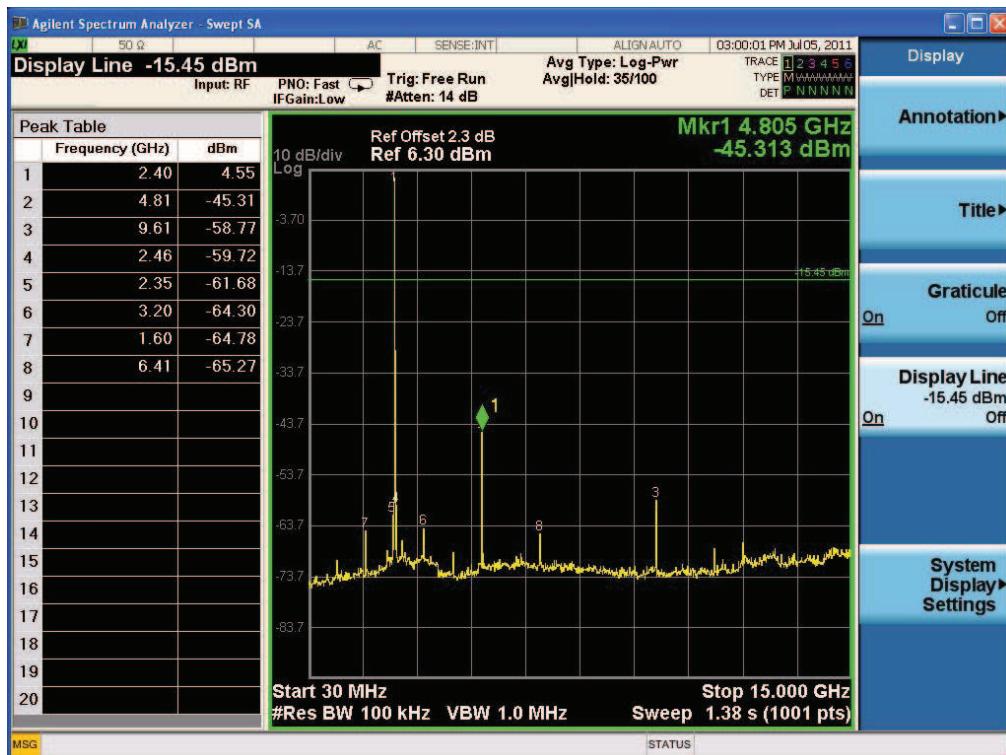
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Band - edge (without Hopping) - 8-DPSK



**Band – edge (at 20 dB blow) – Low channel
Frequency Range = 30 MHz ~ 10th harmonic
(GFSK : Worst-Case)**



**Band – edge (at 20 dB blow) – Mid channel
Frequency Range = 30 MHz ~ 10th harmonic
(GFSK : Worst-Case)**





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**Band – edge (at 20 dB blow) – High channel
Frequency Range = 30 MHz ~ 10th harmonic
(GFSK : Worst-Case)**



2.1.7 Field Strength of Emissions

Test Location

Testing was performed at a test distance of 3 meter Open Area Test Site

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

Center frequency = the worst channel

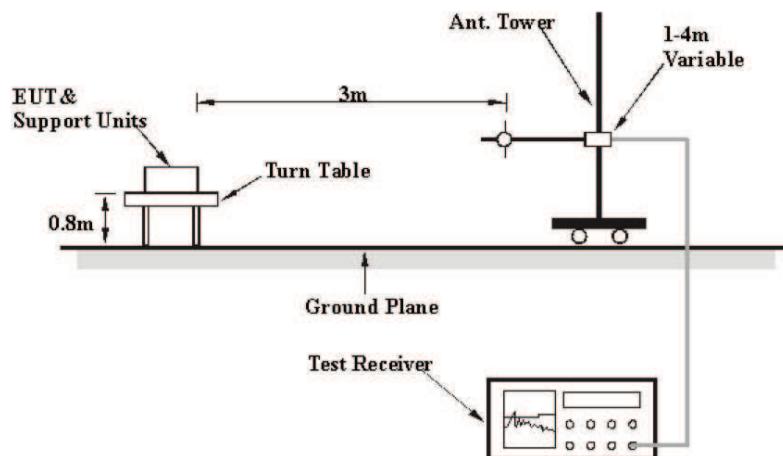
Frequency Range = 30 MHz ~ 10th harmonic

RBW = 120 kHz (30 MHz ~ 1 GHz) VBW \geq RBW
= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = Quasi-peak

Trace = max hold



Limit

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54

** Except as provided in 15.209(g). fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.



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Test Results

Test mode : Hopping(GFSK), CFG PKT Packet Type : 15 Packet Size : 339(DH5)

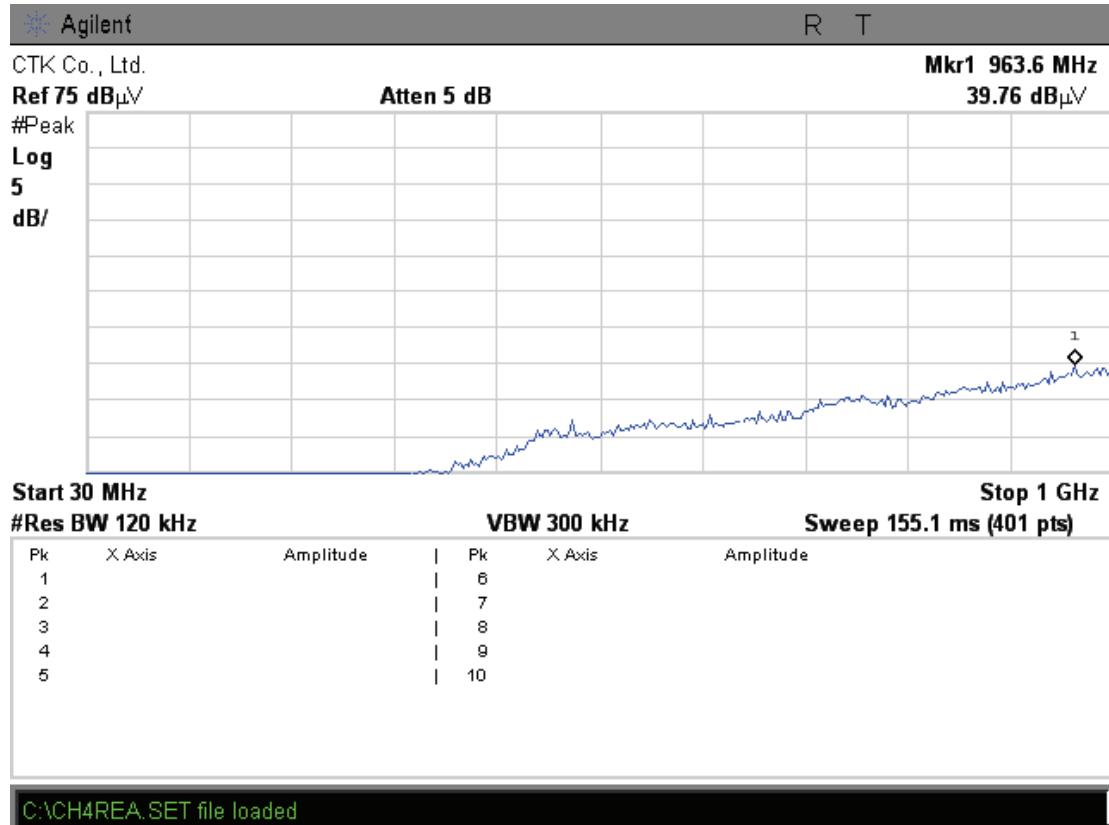
EUT	Mobile Printer	Measurement Detail	
Model	PS20BT	Frequency Range	Below 1000MHz
Test mode	GFSK (Worst case)	Detector function	Quasi-Peak

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Quasi-peak

Test Data



Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	PS20BT	Frequency Range	1-25GHz
Channel	Channel 0	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
			Average / Peak
4804.00	51.0 / 56.7	3.0 / 17.3	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4804.00	41.8 / 47.5	V	1.0	32.7	34.9	11.4	54.0 / 74.0	51.0 / 56.7	3.0 / 17.3

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2389.00	36.1 / 42.0	V	1.0	28.2	35.3	7.4	54.0 / 74.0	36.4 / 42.3	17.6 / 31.7



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	PS20BT	Frequency Range	1-25GHz
Channel	Channel 39	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4882.00	48.0 / 53.6	6.0 / 20.4	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4882.00	38.8 / 44.4	V	1.0	32.7	34.9	11.4	54.0 / 74.0	48.0 / 53.6	6.0 / 20.4

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									



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Test Results

Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)

EUT	Mobile Printer	Measurement Detail	
Model	PS20BT	Frequency Range	1-25GHz
Channel	Channel 78	Detector function	Peak
Test Mode	GFSK (Worst case)		

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
4960.00	43.0 / 51.0	11.0 / 23.0	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
4960.00	33.8 / 41.8	V	1.0	32.7	34.9	11.4	54.0 / 74.0	43.0 / 51.0	11.0 / 23.0

Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
2483.50	25.2 / 36.5	V	1.0	28.2	35.3	7.4	54.0 / 74.0	25.5 / 36.8	28.5 / 37.2



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2.1.8 AC Conducted Emissions

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56*	56 to 46*
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency.

Test Results

The requirements are:

Not Applicable

Test mode : -

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	-



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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2011-11-12
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2011-11-12
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2012-07-07
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2011-11-18
5	LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
6	Attenuator	HP	8498A	1801A06913	2011-11-15
7	EPM Series Power Meter	HP	E4418A	GB38272734	2011-11-12
8	Power Sensor	HP	8487A	3318A03524	2012-07-07
9	Audio Analyzer	HP	8903B	2747A03432	2011-11-12
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2011-11-12
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2011-11-12
12	Modulation Analyzer	HP	8901B	3438A05228	2011-11-16
13	Attenuator	HP	8494A	3308A33351	2011-11-15
14	Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2012-11-14
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2011-11-12
16	EMC Analyzer	Agilent	E7405A	MY45110859	2012-02-11
17	Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
18	Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
19	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2011-09-18
20	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2011-09-18
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2012-03-31
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2011-11-16
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2012-02-09
24	LISN	Rohde & Schwarz	ESH3-Z5	100207	2011-11-15
25	LISN	Rohde & Schwarz	ENV216	101151	2012-03-09
26	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2011-11-12
27	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2012-02-09